

PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To: EDWIN H. TAYLOR
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PCT

WRITTEN OPINION

(PCT Rule 66)

Date of Mailing
(day/month/year)

23 OCT 1997

Applicant's or agent's file reference
42390.P3313

REPLY DUE

within **TWO** months
from the above date of mailing

International application No.
PCT/US96/20522

International filing date (day/month/year)
17 DECEMBER 1996

Priority date (day/month/year)
19 DECEMBER 1995

International Patent Classification (IPC) or both national classification and IPC
Please See Supplemental Sheet.

Applicant
INTEL CORPORATION

1. This written opinion is the first (first, etc.) drawn by this International Preliminary Examining Authority.

2. This opinion contains indications relating to the following items:

- I ☒ Basis of the opinion
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step or industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☒ Certain observations on the international application

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OCT 27 1997

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3. The applicant is hereby invited to reply to this opinion.

When? See the time limit indicated above. ~~The applicant may, before the expiration of that time limit, request this Authority to grant an extension, see Rule 66.2(d).~~

How? By submitting a written reply, accompanied, where appropriate, by amendments, according to Rule 66.3. For the form and the language of the amendments, see Rules 66.8 and 66.9.

Also For an additional opportunity to submit amendments, see Rule 66.4.
For the examiner's obligation to consider amendments and/or arguments, see Rule 66.4 bis.
For an informal communication with the examiner, see Rule 66.6.

If no reply is filed, the international preliminary examination report will be established on the basis of this opinion.

4. The final date by which the international preliminary examination report must be established according to Rule 69.2 is: 19 APRIL 1998

Name and mailing address of the IPEA/US
Commissioner of Patents and Trademarks
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Washington, D.C. 20231

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I. Basis of the opinion

1. This opinion has been drawn on the basis of *(Substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this opinion as "originally filed".)*:

☒ the international application as originally filed.

☒ the description, pages 1-129 , as originally filed.

pages NONE , filed with the demand.

pages NONE , filed with the letter of _____.

☒ the claims, Nos. 1-100 , as originally filed.

Nos. NONE , as amended under Article 19.

Nos. NONE , filed with the demand.

Nos. NONE , filed with the letter of _____.

☒ the drawings, sheets/fig 1-20 , as originally filed.

sheets/fig NONE , filed with the demand.

sheets/fig NONE , filed with the letter of _____.

2. The amendments have resulted in the cancellation of:

☒ the description, pages NONE

☒ the claims, Nos. NONE

☒ the drawings, sheets/fig NONE

3. ☐ This opinion has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the ~~Supplemental Box~~ Additional observations below (Rule 70.2(c)).

4. Additional observations, if necessary:

NONE

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V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. STATEMENT

Novelty (N)	Claims	<u>(Please See supplemental sheet)</u>	YES
	Claims	<u>(Please See supplemental sheet)</u>	NO
Inventive Step (IS)	Claims	<u>(Please See supplemental sheet)</u>	YES
	Claims	<u>(Please See supplemental sheet)</u>	NO
Industrial Applicability (IA)	Claims	<u>(Please See supplemental sheet)</u>	YES
	Claims	<u>(Please See supplemental sheet)</u>	NO

2. CITATIONS AND EXPLANATIONS

1. Claims 1-7, 12, 15-17, 32-33, 52, 62-69 and 74 lack an inventive step under PCT Article 33(3) as being obvious over Cocke et al (U.S. Patent No. 4,992,938).

a. As to claim 1, Cocke discloses a processor comprising : a mapping unit (figure 2 and figure 4 reference number 700; column 4 lines 57-63) coupled to a decode unit (figure 2 reference number 400) and a storage unit (figure 4 reference number 800, 900, and 1000; column 4 line 65 to column 5 line 36), configured to map operands used by a set of instructions to a physical register file in a stack referenced manner (use stack pointer) or non-stack referenced manner (load, store, use queue pointer) (column 2 line 42 to column 3 line 2 and column 5 line 61 to column 6 line 33); and a storage unit, coupled to the mapping unit, including the physical register file (column 10 lines 44-47, 50-52, and 62-63). However, Cocke does not explicitly disclose decode unit configured to decode instructions and their operands. A decode unit is well-known and decode instructions and their operands would have been obvious in the art at the time the invention was made.

b. As to claim 2, Cocke discloses that the mapping unit including a set of tags, each tag in the set of tags corresponding to a different register in the physical register file (column 10 lines 22-24). However, Cocke does not explicitly disclose that identifying if the corresponding register is in an empty or a non-empty state. But, it would have been obvious to one of ordinary skill in the art at the time the invention was made.

c. As to claim 3, it would have been obvious to one of ordinary skill in the art at the time the invention was made (Continued on Supplemental Sheet.)

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

1. The figures 8, 11A-11C and 13 are objected to under PCT Rule 66.2(a)(iii) as containing the following defect(s) in the form or content thereof:
Figure 8 include the following reference sign(s) not mentioned in the description : step 920.
Figures 11A-11C do not include the following reference sign(s) mentioned in the figure 13 : step 1140 & step 1142.
figure 13 include the following reference sign(s) not mentioned in the description : step 1140 & step 1142.
Correction is required.

2. The description is objected to as containing the following defect(s) under PCT Rule 66.2(a)(iii) in the form or contents thereof:
There is no brief description for figure 12C in the specification.
Correction is required.

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VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

1. Claims 3 and 66 are objected to under PCT Rule 66.2(a)(v) as lacking clarity under PCT Article 6 because the claims 3 and 66 are indefinite for the following reason(s):

Claim 3 contains "...sometime..." in lines 3 and 6 which is unclear about time and also claim 3 is unclear about a set of transition instructions. Same arguments applies to claim 66.

2. Claims 2 and 65 are objected to under PCT Rule 66.2(a)(v) as lacking clarity under PCT Article 6 because the claims 2 and 65 are indefinite for the following reason(s):

Claim 2 contains in line 3 "...corresponding to corresponding a...". Same arguments applies to claim 65.

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Supplemental Box

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: Boxes I - VIII

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TIME LIMIT:

The time limit set for response to a Written Opinion may not be extended. 37 CFR 1.484(d). Any response received after the expiration of the time limit set in the Written Opinion will not be considered in preparing the International Preliminary Examination Report.

CLASSIFICATION:

The International Patent Classification (IPC) and/or the National classification are as listed below:

IPC(6): G06F 9/00, 9/30, 9/34, 9/38, 12/00, 12/02, 7/48

US Cl.: 395/393, 394, 412, 413, 496, 563, 587, 800; 364/747, 748

V. 1. REASONED STATEMENTS:

The opinion as to Novelty was positive (YES) with respect to claims 1-100.

The opinion as to Novelty was negative (NO) with respect to claims NONE.

The opinion as to Inventive Step was positive (YES) with respect to claims 8-11, 13-14, 18-31, 34-51, 53-61, 70-73, and 75-100.

The opinion as to Inventive Step was negative (NO) with respect to claims 1-7, 12, 15-17, 32-33, 52, 62-69, and 74.

The opinion as to Industrial Applicability was positive (YES) with respect to claims 1-100.

The opinion as to Industrial Applicability was negative (NO) with respect to claims NONE.

V. 2. REASONED STATEMENTS - CITATIONS AND EXPLANATIONS (Continued):

to keep the set of tags to the non-empty state when a set of instructions is not executed after a previous set of instructions.

d. As to claims 4-5, it would have been obvious to one of ordinary skill in the art at the time the invention was made to change the set of tags to the empty state in response to the processor receiving a set of instructions and the non-empty state in response to the processor receiving at list one of the set of instructions.

e. As to claim 6, Cocke discloses that the storage unit further includes a second physical register file (figure 4 reference number 800, 900, and 1000; column 4 line 65 to column 5 line 36 and column 10 lines 44-47, 50-52, and 62-63); and the mapping unit initially maps operands used by instructions to a set of buffer registers (FREE_LIST) (figure 4 reference number 1000) and the storage unit retires those operands from the second physical register file to the first physical register file (figure 4; column 10 lines 36-66).

f. As to claim 7, Cocke discloses a set of buffer registers (FREE_LIST) (figure 4 reference number 1000), but Cocke does not disclose that the set of buffer registers is a plurality of reservation stations. Clift discloses a reservation station (figures 1 and 13 reference number 75) which receives the renamed sources and destinations (column 11 lines 25-29 and column 50 lines 10-20). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a reservation station of Clift in the processor of Cocke to store pending errors from previous instructions because it would improve utilization of the processor.

g. As to claims 12 and 15, Cocke discloses that the mapping unit is also configured to map operands used by a new set of instructions to a new physical register file in a stack referenced manner (use stack pointer) (column 2 line 42 to column 3 line 2 and column 5 line 61 to column 6 line 33) contained in the storage unit (column 10 lines 44-47, 50-52, and 62-63).

h. As to claim 16, Cocke discloses that operands used by the sets of instructions are at least partially aliased on the physical register file (see abstract).

i. As to claim 17, lack of inventive step of the claim 1 equally apply here. Additionally, Cocke discloses a first unit (register file-figure 1 reference number 24) including a physical register file; and a second unit (register

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Supplemental Box

(To be used when the space in any of the preceding boxes is not sufficient)

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renaming-figure 1 reference number 20), coupled to the decode unit (figure 2 reference number 600) and the first unit (figures 1-2; column 9 lines 7-46).

j. As to claims 32-33, Cocke discloses a execution (arithmetic) unit (figure 1 reference number 22), coupled to the second (register renaming) unit (figure 1 reference number 20) and register file; and the execution unit writes operands to as a result of executing instructions from the set of instructions (figure 1; column 4 lines 10-37 and column 9 lines 7-22).

l. As to claims 52 and 62-63, lack of inventive step of the claims 17 and 32-33 equally apply here. For example, claim 52 corresponds to claim 17, claim 62 corresponds to claim 32, and claim 63 corresponds to claim 33.

m. As to claims 64-69 and 74, lack of inventive step of the claims 1-6 and 12 equally apply here. For example, claim 64 corresponds to claim 1, claim 65 corresponds to claim 2, claim 66 corresponds to claim 3, claim 67 corresponds to claim 4, claim 68 corresponds to claim 5, claim 69 corresponds to claim 6, and claim 74 corresponds to claim 12.

NEW CITATIONS

NONE